UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

UNITED STATES OF AMERICA	)	
	)	
v.	)	CRIMINAL NO. 13-10200-GAO
	)	
DZHOKHAR TSARNAEV	)	

MOTION TO EXCLUDE TESTIMONY OF CERTAIN CONCLUSIONS REGARDING DNA MATCHING

Defendant, Dzhokhar Tsarnaev, by and through counsel, respectfully moves, pursuant to Federal Rules of Evidence 403, 702, 703, and the Fifth, Sixth, and Eighth Amendments to the United States Constitution, to exclude the government's proposed expert testimony regarding DNA recovered from the interior of the right glove recovered from the Honda Civic at the Laurel/Dexter scene in Watertown. Defendant submits that, at a minimum, the Court must schedule a hearing to determine the admissibility of the proposed testimony.

FACTS

Derived from the indictment and various discovery materials, the following narrative summarizes the facts which the government has indicated it will introduce to allege that the defendant had a direct role in the death of MIT Police Officer Sean Collier. For the purpose of focusing on why the evidence and testimony should be excluded, the Defendant does not herein debate or discuss those facts beyond reciting the narrative as detailed by the government.

On Thursday, April 18, 2013, at approximately 10:30 p.m., MIT Police Officer Sean Collier was shot to death in his police car in Cambridge. Roughly two hours later,

Dzhokhar Tsarnaev ("Dzhokhar") and his brother Tamerlan Tsarnaev ("Tamerlan") were stopped by police near the intersection of Laurel Street and Dexter Avenue and confronted. Tamerlan fired a gun repeatedly and three improvised explosive devices were detonated. After the gun he was using jammed, Tamerlan threw the weapon at an advancing police officer and was then subdued. Dzhokhar used a pellet gun in an effort to make it appear to officers that he was firing also. Tamerlan was injured at the scene and died shortly thereafter. Dzhokhar was captured some 15 hours later after he was found hiding in a boat in Watertown.

State and federal evidence technicians processed the Laurel/Dexter scene, including several cars. Two mismatched gloves were recovered from the front driver's floor area of a Honda Civic, registered to the Tsarnaev brothers' father, which had been abandoned on Laurel Street. The gloves were forwarded to the Massachusetts State Police Forensic Services Group, which tested the gloves first for gunshot residue (positive), then for the presence of blood (positive), and finally for DNA. The DNA testing and reporting of the conclusion as to the right glove— the sole evidence which purportedly connects Dzhokhar to this offense — is the subject of this Motion.

The government has indicated that it will call Massachusetts State Police Forensic Services Group scientist Jennifer Montgomery, the analyst who performed the DNA testing on the gloves, to testify that DNA extracted from blood recovered from the exterior of the two gloves matched the DNA profile of Officer Collier. The blood on the exterior did not match the profiles of either Dzhokhar or Tamerlan. Ms. Montgomery's report (attached hereto as Exhibit A), summarizes her finding, derived from population

statistics databases, that the chances of a random match to the DNA on the exterior of the gloves was 1 in 3 quintillion. *Id.*

The government also proposes to have Ms. Montgomery testify to the testing and purported matches from the inside of the two recovered gloves. As to the left glove, the government indicates:

> [Ms. Montgomery] will testify that . . . DNA profiling of the blood[1] recovered from the interior palmar side of the left glove's thumb, index, middle, and ring fingers [] indicated a mixture of DNA from at least two individuals. The major DNA profile from this blood matched Tamerlan Tsarnaev's DNA profile but did not match Dzhokhar Tsarnaev's or Officer Sean Collier's. The expected frequency of a randomly selected unrelated individual having a DNA profile matching that obtained from this item is smaller than 1 in 3 quintillion among the Caucasian population and even smaller among other populations.

As to the right glove, the government proposes Ms. Montgomery will testify to the following:

> DNA profiling of blood[2] recovered from the palmar side of the right glove (Item No. 12-9.5.1) indicated a mixture of DNA from at least three individuals. Both Tamerlan and Dzhokhar Tsarnaev's profiles are included as potential contributors in this DNA mixture.

Gov't Letter of September 2, 2014 at 8. Absent from the proposed testimony — as it is from Ms. Montgomery's underlying report — is any mention of the expected frequency of a random matching for the DNA obtained from the right glove. The government's position appears to be that Ms. Montgomery should be permitted to

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[1] Although the government asserts in its September 2 letter that the profiles from the glove interiors were extracted from blood, neither Ms. Montgomery's reports nor any of the underlying documentation provide support for that assertion.

[2] *Id.*

identify the defendant as a "potential contributor" without the context of random match population statistics. Such testimony must be excluded pursuant to Federal Rules of Evidence 402, 403, and 702, *Daubert v. Merrell Dow Pharmaceutical*, 509 U.S. 579 (1993), and the due process and fair trial clauses of the Fifth and Sixth Amendments to the Constitution.

ARGUMENT

IN THE ABSENCE OF SCIENTIFICALLY RELIABLE RANDOM MATCH STATISTICS, TESTIMONY THAT TAMERLAN OR DZHOKHAR TSARNAEV ARE "POSSIBLE CONTRIBUTORS" IS UNRELIABLE, SPECULATIVE, IRRELEVANT, AND MORE PREJUDICIAL, MISLEADING, AND CONFUSING THAN PROBATIVE; ANY TESTIMONY ABOUT THE SAMPLE FROM THE RIGHT GLOVE IS INADMISSIBLE UNDER RULES 402, 403, AND 702, AS WELL AS UNDER *DAUBERT* AND THE DUE PROCESS, AND FAIR TRIAL PROVISIONS OF THE FIFTH AND SIXTH AMENDMENTS TO THE CONSTITUTION.

Testimony that the defendant's or Tamerlan's DNA profile indicates that they are possible contributor to the DNA in a sample is impossible to understand and evaluate without random match statistics. As Judge Barbadoro explained in *United States v. Shea*, 957 F.Supp. 331 (D.N.H.1997), *aff'd,* 159 F.3d 37 (1998), *cert. denied*, 526 U.S. 1077 (1999):

> Random match probability estimates calculated with the product rule provide an important means of placing the significance of a DNA profile match in an appropriate context . . .. *When the significance of a random match probability estimate is properly explained*, the probative value of the evidence is not substantially outweighed by the limited potential that jurors could be misled.

Id. at 337-38 (emphasis supplied). Similarly, the court in *United States v. Coronado-Cervantes*, 912 F.Supp. 499, 500 (D.N.M.1996), explained:

> When the laboratory work is completed and a DNA profile from a suspect has been declared to match the DNA profile of the perpetrator, it means the suspect cannot be excluded as a possible contributor of the DNA found at the crime scene. Statistics must then be generated to give significance to the match by demonstrating how probable it is that a random match could occur, i.e., that the suspect's DNA profile and the perpetrator's DNA profile would match if they were not the same person.

As the California Supreme Court succinctly explained the issue, the value of such evidence depends on the statistical probability of finding a "consistent" profile in the general population:

> A determination that the DNA profile of an evidentiary sample matches the profile of a suspect establishes that the two profiles are consistent, but the determination would be of little significance if the evidentiary profile also matched that of many or most other human beings. The evidentiary weight of the match with the suspect is therefore inversely dependent upon the statistical probability of a similar match with the profile of a person drawn at random from the relevant population.

People v. Venegas, 18 Cal.4th 47, 82, 954 P.2d 525, 548-9 (1998); *see also United States v. Davis*, 602 F.Supp.2d 658, 673 (D. Md. 2009) ("[t]he Court agrees [with *Venegas*] that DNA evidence cannot be admitted in a vacuum; the Government must also present some additional information with which a jury can accurately assess the significance of the consistency between a defendant's DNA profile and that of the evidence.").

As the *Davis* court held, to determine whether the DNA evidence in this case deserves great weight, little weight, or no weight at all, the jury must have statistical data on the probability of finding the "consistent" profile in relevant reference populations. "Without the probability assessment, the jury does not know what to make of the fact that the patterns match: the jury does not know whether the patterns are as common as pictures with two eyes, or as unique as the Mona Lisa." *United States v. Yee*, 134 F.R.D.

161, 181 (N.D. Ohio 1991), *aff'd. sub nom., United States v. Bonds*, 12 F.3d 540 (1993); *see also United States v. McCluskey,* 954 F.Supp.2d 1224, 1267 (D.N.M. 2013) ("statistics are offered to help the jury evaluate the significance of the DNA evidence"); *United States v. Morrow*, 374 F.Supp.2d 51, 63 (D.D.C. 2005) ("Without statistical data on the frequency of the matching characteristics in the relevant reference population ... the jury was left to speculate about the value of the DNA evidence.").

The vast majority of federal cases in which DNA evidence has been admitted hew to the proposition that evidence of a DNA match must be accompanied by statistical information. *See*, *e.g.*, *McCluskey,* 954 F.Supp.2d at 1270 (requiring government to introduce the statistical analysis of random match probability in its case-in-chief); *United States v. Wright*, 215 F. 3d 1020, 1025 (9th Cir. 2000) ("the probability that the DNA of a Black individual selected at random would match the DNA recovered from the crime scene was approximately one in 1.3 billion"); *United States v. Davis*, 40 F.3d 1069, 1073 (10th Cir.1994)(RFLP expert "based her testimony on population genetics and stated that the frequency of such random matches among African–Americans to be 1 in 30,000 for Mr. Davis and 1 in 600,000 for Mr. Reed."); *United States v. Ewell*, 252 F.Supp.2d 104, 113 n. 12 (D.N.J.2003) ("the probability of a random DNA match is one in 280 million"); *United States v. Gaines*, 979 F.Supp. 1429, 1431-32 (S.D. Fla. 1997) (probability of random match ranged from 1 in 6.1 million to 1 in 170 million); *United States v. Lowe*, 954 F.Supp. 401, 416-17, 420-21 (D.Mass.1996) (match probability ranged from 1 in 11 billion for the Caucasian population to 1 in 810,000 for the same

population); *Shea*, 957 F.Supp. at 335 (probability of random match in Caucasian population was 1 in 200,000).

The necessity of using statistics to explain the value of DNA evidence has been widely acknowledged. As the Tenth Circuit has stated, "statistical probabilities are basic to DNA analysis and their use has been widely researched and discussed." *United States v. Davis*, 40 F.3d 1069, 1075 (10th Cir.1994). A number of legal commentators have suggested that the admissibility of DNA evidence depends on having scientifically valid statistics on the frequency of the matching DNA profiles. *See, e.g.,* David L. Faigman, et al., 4 Mod. Sci. Evidence § 30:14 (2001 edition) ("Unless some reasonable explanation accompanies testimony that two profiles match, it is surely arguable that the jury will have insufficient guidance to give the scientific evidence the weight it deserves."); Kenneth S. Broun, 1 McCormick On Evidence, Sec. 210 (6th ed. 2006)("[W]ithout being informed of such background statistics, the jury is left to its own speculations").

Scientific experts have also declared that numbers are necessary to give meaning to DNA evidence. For more than twenty years the National Research Council,[3] beginning with the NRC's issuance of its 1992 report *DNA Technology in Forensic*

[3] When the NAS National Research Council speaks, courts listen. *See, e.g., Melendez-Diaz v. Massachusetts*, 557 U.S. 305, 318 (2009) (quoting the NAS 2009 Report for the propositions that "[f]orensic evidence is not uniquely immune from the risk of manipulation," and that "'[t]he forensic science system, encompassing both research and practice, has serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country.'"); *United States v. Davis,* 602 F.Supp.2d 658, 663 n.2 (D. Md. 2009) ("The NRC II is widely regarded as one of the definitive publications on the use of DNA evidence in the field of forensics.").

Science (hereinafter "NRC I"), has been adamant about the need to present statistics in connection with DNA evidence :

> Interpreting a DNA typing analysis requires a valid scientific method for estimating the probability that a random person might by chance have matched the forensic sample at the` sites of DNA variation examined. A judge or jury could appropriately weigh the significance of a DNA match between a defendant and a DNA sample if told, for example, that "the pattern in the forensic sample occurs with a probability that is not known exactly but is less than 1 in 1000"...To say that two patterns match, without providing any scientifically valid estimate (or, at least an upper bound) of the frequency with which such matches might occur by chance, is meaningless...DNA "inclusions" cannot be interpreted without knowledge of how often a match might be expected to occur in the general population.

NRC I at p. 74-75.

Like its predecessor, National Research Council's *The Evaluation of Forensic DNA Evidence*, (1996) (hereinafter "NRC II") declared that "[i]t would not be scientifically justifiable to speak of a match as proof of identity in the absence of underlying data that permit some reasonable estimate of how rare the matching characteristics actually are." *Id.* at p. 192. "Certainly, a judge's or juror's untutored impression of how unusual a DNA profile is could be very wrong. This possibility militates in favor of going beyond a simple statement of a match, to give the trier of fact some expert guidance about its probative value." *Id.* at p. 193.

The most recent NAS 2009 Report specifically recognized the problem with the type of opinion — the defendant is "included as a potential contributor" —being offered in this case:

> The terminology used in reporting and testifying about the results of forensic science investigations must be standardized. Many terms are used by forensic scientists in scientific reports and in court testimony that

> describe findings, conclusions, and degrees of association between evidentiary material (e.g., hairs, fingerprints, fibers) and particular people or objects.
>
> Such terms include, but are not limited to "match," "consistent with," "identical," "similar in all respects tested," and "cannot be excluded as the source of." The use of such terms can and does have a profound effect on how the trier of fact in a criminal or civil matter perceives and evaluates scientific evidence.

National Research Council, *Strengthening Forensic Science in the United States: A Path Forward* (2009) (hereinafter "NRC (2009)") at 21. NRC (2009) concludes that "[t]he concept of individualization is that an object found at a crime scene can be uniquely associated with one particular source. By acknowledging that there can be uncertainties in this process, the concept of 'uniquely associated with' must be replaced with a probabilistic association, and other sources of the crime scene evidence cannot be completely discounted." *See also* John M. Butler, *Fundamentals of Forensic DNA Typing* (2010) at p. 230 ('Statistics attempt to provide meaning to the match.").

As a consequence, the dominant accreditation authority, the American Society of Crime Laboratory Directors / Laboratory Accreditation Board ("ASCLD/LAB-International") has included statistical analysis as a requirement in results reporting:

> All ASCLD/LAB-International accredited laboratories are required to report and properly qualify the results of each test or series of tests accurately, clearly, unambiguously and objectively to meet 5.10.1 of ISO/IEC 17025:2005. In addition, laboratories are required to clearly communicate and properly qualify the significance of associations in the test report to meet 5.10.3.5 of the ASCLD/LAB-International Supplemental Requirements for Testing Laboratories (2011). The purpose of this requirement is to ensure that positive associations made by the laboratory are reported in such a way that the reader of the report is able to accurately evaluate the significance of the association. The testing laboratory should have an awareness of and avoid circumstances whereby the reporting

> language might be misleading and attributes a greater significance to a test than the results for that test support.
>
> *With respect to DNA associations, statistical calculations for the results of each test in which a positive association is made must be clearly and properly qualified in the test report.* This does not apply to associations made between the profile derived from an intimate sample and the individual from whom that sample was collected. In addition, statistical calculations for more than one test can be reported together if the results of those calculations are identical or, where applicable, are above a laboratory-defined source attribution threshold

ASCLD/LAB-International Board of Directors Clarification to §§ 5.10.1 and 5.10.3.5 (supplemental testing requirements as updated July 26, 2014) (emphasis supplied), *available at* <http://www.ascld-lab.org/ascldlab-international-testing-program-board-interpretations>.

Both the Massachusetts State Police and the FBI recognize the necessity of a statistical statement about the frequency of occurrence. The Massachusetts State Police Forensic Services Group *DNA Case File and Report Preparation Guidelines* § 4.8.3 specifies that a DNA-STR Comprehensive Report, like the one produced by Ms. Montgomery here, should include "Population database used to generate any statistical calculations," and "[l]isted reference for statistical calculations, if applicable." A copy of the MSP FSG Guidelines are attached hereto as Exhibit B. The FBI's standard is even more forceful, as it mandates (in accord with ASCLD/LAB-International requirements) the reporting of random match probabilities from population statistics where there is a match that is intended to be used for probative value: "Random match probabilities *must only be calculated* for Q [questioned] specimen(s) if the DNA typing result of a Q specimen matches that of a K [known] specimen, and the match is determined by the

Examiner to be probative (*e.g.*, the victim's DNA typing results present on clothing recovered from a suspect). FBI DNA Procedures Manual § 7.9.2 (attached hereto as Exhibit C).

Although the First Circuit has not explicitly addressed the issue, it approved and adopted Judge Barbadoro's thoughtful rationale regarding the admissibility of DNA analysis, which explicitly included random match statistical analysis as its cornerstone. *Shea*, *supra*, 957 F.Supp. at 345-346 (random match probability estimates reduce the risk of misleading the jury when DNA match testimony is introduced), *aff'd,* 159 F.3d 37 (1998), *cert. denied*, 526 U.S. 1077 (1999). And appellate courts in other jurisdictions have considered whether DNA evidence is admissible in the absence of statistical data. With very few exceptions, courts have required that statistics be presented as a condition of admissibility. For example, in *United States v. Porter*, 618 A.2d 629 (D.C. 1992) the Court of Appeals addressed the admissibility of evidence of a "match" between a suspect's DNA profile and an evidence sample profile. The Court of Appeals noted that, because a person's forensic DNA profile is made up only of a limited number of genetic markers out of the millions of DNA sequences in a person's entire DNA strand, it is possible for two people to coincidentally have the same profile. 618 A.2d at 632. Accordingly, the court held that DNA match evidence is not probative without an estimate of the chance that the match is merely coincidental. Because jurors lack the scientific knowledge to assess the likelihood of a coincidental match, DNA match "evidence is probative" only if accompanied by an accurate statistical estimate of the "probability of a coincidental match." 618 A.2d at 631.

Numerous other courts agree. *See, e.g., State v. Wright*, 360 Mont. 246, 255, 253 P.3d 838, 844 (2011) ("Without reliable accompanying evidence as to the likelihood that other individuals in a given population could be a match (or could not be excluded as possible contributors), the jury has no way to evaluate the meaning of the result."); *Commonwealth v. Mattei*, 455 Mass. 840, 920 N.E.2d 845 (2010) (reversible error to admit expert testimony that the defendant could not be excluded as a potential source of DNA found at the crime scene unless there was accompanying testimony explaining the statistical significance of those non-exclusion results); *Deloney v. State*, 938 N.E.2d 724, 730 (Ind.App. 2010) ("DNA evidence that does not constitute a match or is not accompanied by statistical data regarding the probability of a defendant's contribution to a mixed sample is not relevant, Evid. R. 402, and should not be admitted."); *People v. Coy*, 243 Mich. App. 283, 620 N.W.2d 888 (2000) (plain error to present a DNA match in a mixed stain without a qualitative or quantitative estimate of its significance); *Peters v. State*, 18 P.3d 1224 (Alaska Ct. App. 2001) (error to introduce "consistent with" testimony for mixed stains unaccompanied by any further indication of probative value) .

In the present case, as outlined above, no random match statistical estimates have been made with respect to the sample from the interior of the right glove. Consequently, there is no scientific basis for any claim about the probative value of the DNA evidence on these samples and no foundation for any expert testimony about these samples. In the absence of a scientifically valid statistical estimate, the value of the proposed testimony about these samples is entirely speculative.

Finally, at least two district courts have excluded DNA evidence on Rule 403 grounds where weak statistical evidence was offered in support of a DNA match. *See United States v. Natson*, 469 F.Supp.2d 1253 (M.D.Ga. 2007); *United States v. Graves*, 465 F.Supp.2d 450, 459 (E.D.Pa. 2006). Where, as where, the statistics are not just weak but non-existent, there is even greater reason to exclude the testimony under Rule 403. *See Shea*, 957 F.Supp. at 345-346 (potential for misleading jurors is minimized where statistical analysis introduced); *see also Commonwealth v. Mattei*, 455 Mass. 840, 852, 920 N.E.2d 845 (Mass. 2010) ("[A]dmitting evidence of a failure to exclude without accompanying evidence that properly interprets that result creates a greater risk of misleading the jury and unfairly prejudicing the defendant than admission of a 'match' without accompanying statistics.").

Here, in the absence of scientifically reliable statistics, evidence that the defendant's DNA profile makes him a "potential contributor" to the sample obtained from inside the right glove is unreliable, speculative, irrelevant, and more prejudicial, misleading, and confusing than probative. Thus any testimony about this particular sample is inadmissible under Federal Rules of Evidence 402, 403, and 702, as well as under *Daubert* and the due process and fair trial of the Fifth and Sixth Amendments to the Constitution.

CONCLUSION

Based on the foregoing, the defense moves that the Court exclude testimony and evidence that the defendant was a potential contributor to the DNA extracted from the inside of the right golf glove recovered from the Honda Civic at the Laurel/Dexter Scene.

Respectfully submitted,

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by his attorneys

/s/

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